SIR WILLIAM THOMSON.

SIR WILLIAM THOMSON'S presence in this country, the prominent part he has taken in the two great scientific meetings held in America this year, and his course of lectures at the Johns Hopkins university, which has been attended by professors and students of physics from all parts of the country, will make a brief sketch of the man and of his work especially welcome at this time.

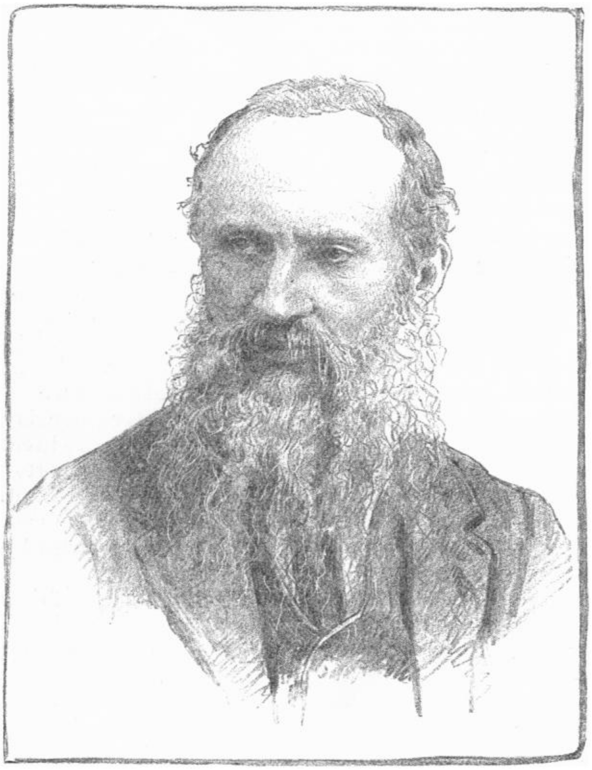
Born at Belfast in 1824, he showed at a very early age that the remarkable mathematical talent possessed by his father was to reappear in him with at least equal intensity. At the University of Glasgow, where his father held the chair of mathematics, he was, at the age of eleven or twelve, already noted among his much older classmates for his ability and originality. At the age of seventeen he began the splendid series of contributions to mathematical physics which have formed so great a factor in the progress of physical science. These first papers, written at so early an age, were of a nature to require a profound knowledge of both mathematics and physics; the first being a defence of Fourier's mathematical methods against some objections which had been made to them, and the second relating to the mathematical theory of heat and of electricity.

A mere glance at the list of Sir William Thomson's papers, as given in the Royal society's catalogue, serves to convey some idea of the diversity of mathematical and physical subjects upon which he has written. Running down the list in chronological order, and noting only here and there a title, we find him discussing the equations of motion of heat, the lines of curvature of surfaces of the second order, electric images, terrestrial magnetism, the theory of partial differential equations, the economy of heating or cooling buildings by currents of air, the dynamical theory of heat, the dissipation of energy, the density of the luminiferous ether, the theory of elasticity, the calculation of a certain class of definite integrals, the interior melting of ice, Leverrier's investigations on the motion of Mercury, the protection of vegetation from destructive cold at night, vortex atoms, — but we must make an end somewhere.

It is, of course, needless to say to the readers of this journal that it is not upon the number or diversity of his contributions to science that Sir William Thomson's fame and pre-eminence rest, but upon the fundamental importance and epoch-making character of some of those contributions. The article upon Sir William Thomson in the Scientific worthies series (*Nature*, 1876) gives a brief summary of some of his most important researches and inventions. We can here do hardly more than allude to a few of them, referring readers, for a fuller account, to the above article, from which we freely draw. Probably his most important contributions to mathematical physics have been his researches in electrostatics and magnetism. His first paper in this department of physics, on the elementary laws of statical electricity, written at the age of twenty-one, demonstrated that results which had previously been accepted were erroneous through a failure to adopt necessary precautions in the experiments upon which those results were based. In this paper he also began the work of founding the mathematical theory of electricity upon Faraday's theory of electrical induction, — a work which his later papers completed. In this field, as in many others, his work was not confined to mathematical, nor even to mathematical and experimental research: an almost equally notable part of it was the invention of most important and ingenious electrometric instruments, which have constituted the chief means of establishing our present system of practical electrometry.

His contributions to thermodynamics have also been of the highest and most fundamental importance. He was among the first physicists to thoroughly appreciate the effect, upon the theory of heat, of Joule's determination of the mechanical equivalent of heat; and, in the series of memoirs which he wrote upon thermodynamics, he placed the science thoroughly upon the new scientific basis of the doctrine

of heat as a mode of motion. He was the first to propose the use of an absolute thermodynamic scale for the measurement of temperature; and, in his paper on the electrodynamic qualities of metals, he presented his discovery of the electrical convection of heat, and of a great number of important relations between thermal and electric properties of matter. Perhaps the most striking of the results to which his studies in thermodynamics led him was the theory of the dissipation of energy.



The almost random list of papers which we gave above was designed to illustrate the variety, rather than the importance, of Sir William Thomson's work; but it is hardly necessary to say that many of his researches on subjects very wide apart have been profound and important. His great investigations on the subject of vortex motion, to which he has devoted much attention for so many years, his researches on the tides, his contributions to hydrodynamics, his researches on the physical condition of the earth, have all been of signal importance; and the highly original method of attacking the problem of the wave-theory of light, of which he gave some account in his recent Johns-Hopkins lectures, has long been occupying his mind, and may fairly be expected to give rise, in the not very distant future, to results rivalling in value any of his former discoveries.

Besides his contributions to the advancement of pure science, Sir William Thomson has been the originator of improvements and inventions of the highest immediate practical utility. The most prominent of his services of this character have been those connected with submarine telegraphy. Space does not permit our entering into details: but it may be mentioned, that he discovered the law of the 'retardation of signals,' which was the chief preliminary difficulty to be faced by those considering the feasibility of using a cable stretching under the ocean, from the old to the new world; that, to meet this difficulty, he invented the 'mirror galvanometer,' which, when the cable of 1858 came to be laid, was employed during the brief period of its successful operation; and that, when this cable broke, on account of difficulties and imperfections connected with its submersion, he devoted himself with signal success to improving the construction of cables, and the mechanical arrangements for their submersion.

The very great benefits conferred upon the world by the labors of Thomson and others, who contributed to overcoming the difficulties which were so triumphantly surmounted in 1866, were recognized by the bestowal upon them of the honor of knighthood. Other important improvements in telegraphy are due to him, but we must omit mention of them.

Two important improvements in navigation are also due to Sir William Thomson, — his improved mariner's compass, which has been adopted, we believe, by the British and French navies, and which is extensively in use upon large vessels generally; and his more recent invention of a navigational sounding-machine — navigational, as distinguished from the deep-sea sounding apparatus devised by him for purposes of research. The navigational sounding-machine permits of soundings being taken at intervals of a few minutes, in water of the depth of a hundred fathoms; and thus it gives navigators — who, it is to be hoped, will soon avail themselves of this new safeguard — the means of easily getting warning of danger long before it is imminent.

We cannot conclude even this brief and imperfect sketch of Sir William Thomson's work, without mention of the great treatise on natural philosophy upon which he and Professor Tait have united their labors.

To those who have had the privilege of personal contact with Sir William Thomson, his name will always be associated with the idea of personal lovableness and kindness, gentleness and modesty, even more than with that of scientific greatness. Every one who attended his recent lectures must have been deeply impressed with the truth of Helmholtz's remark, that "the gift to translate real facts into mathematical equations, and *vice versa*, is by far more rare than that to find the solution of a mathematical problem; and in this direction Sir William Thomson is most eminent and original." But he could hardly fail to be as strongly impressed with his possession, in an equally rare degree, of genuine and unaffected modesty, enthusiastic appreciation of the achievements of others, and tender consideration for all those whom the chances of time bring into connection with him, whether it be for a lifetime of friendship, or for a few fleeting weeks of union as teacher and pupil.

The accompanying portrait is after a crayon from a photograph taken in Montreal during the recent meeting of the British association.

THE NEW VOLCANO OF THE BERING SEA.[1]

Since the appearance in *Science* (vol. iii., No. 51, pp. 89–93) of Professor Dall's paper upon this new volcano, Lieut. G. M. Stoney, U.S.N., has embodied in an official report the results of a personal examination of this locality. It will be recalled that when Professor Dall surveyed the island of Ioanna Bogoslova (St. John the theologian) in 1873, seventy-seven years after its appearance by violent upheaval, he found, that with the exception of the small reef near Umnak, and of the rocks within a short distance of Bogoslova, there was water more than eight hundred fathoms in depth on all sides of the island.

In October, 1883, a violent disturbance burst forth, contemporaneous almost with that at Mount St. Augustine, described in *Science* (vol. iii., No. 54) by Professor Davidson, and resulting, as was believed, in the formation of a new island. The last reports of this, while agreeing materially with Professor Dall's conclusions, show, that, while no new island was formed, Bogoslova was extended; that the old volcano was supplemented by another, which is still active; and that where was relatively great depth of water there is now a land-formation nearly three hundred feet in height.

Lieut. Stoney reports that the new volcano was first seen by Capt. Hague in October, 1883, and suggests for it, in lieu of the name 'Grewingk' proposed by Dall, that of its discoverer.

There is no lack of definiteness as to the date of this new formation, all accounts agreeing that the violent eruptions began early in 1883, and culminated about the 16th of October, when "a dark cloud of indescribable appearance covered the sky northward from Unalashka, and hung very near the earth for some time, excluding the light of the sun, and accompanied by a rise of temperature. In about half an hour this cloud collapsed, and covered the earth with dull, gray, cottony ashes of extreme lightness." During this period the volcano of Makushin, on Unalashka, was quiet, though shocks were felt there; and in the subsequent survey, Stoney found that "the dust and ashes which fell in Unalashka were the same as those seen on the sides of the new volcano."

On the 27th of May of this year, Stoney saw, after leaving this last island, the smoke of the new volcano, then distant forty-five miles, and bearing south-west; and by three A.M. of the 28th it was in plain view, the base distinct,

[1] Communicated by the U. S. hydrographic office.